Claims

1. A single substrate hydrogen and microwave absorber for attenuating unwanted microwave signals in a metal Integrated Microwave Assembly (IMA) and reducing hydrogen poisoning of hydrogen sensitive components implemented in the IMA, the single substrate hydrogen and microwave absorber comprising:

a titanium substrate;

channels formed in the titanium substrate and spaced apart from one another by a predetermined distance;

a layer of microwave absorbing material formed on portions of the titanium substrate between the channels; and

a layer of hydrogen getting material formed in the channels of the titanium substrate.

2. The single substrate hydrogen and microwave absorber of claim 1, wherein the layer of microwave absorbing material formed on the portions of the titanium substrate between the channels comprises a layer of magnetic material for dissipating spurious internal radio frequency (RF) signals.

3. The single substrate hydrogen and microwave absorber of claim 1, wherein the layer of microwave absorbing material formed on the portions of the titanium substrate between the channels comprises a layer of magnetic material for dissipating spurious external radio frequency (RF) signals.

4. The single substrate hydrogen and microwave absorber of claim 3, wherein the layer of magnetic material for dissipating spurious external radio frequency (RF) signals has a thickness within a range of approximately .001-.002 inches.

5. The single substrate hydrogen and microwave absorber of claim 1, wherein the hydrogen getting material formed in the channels of the titanium substrate comprises a material for catalytically splitting hydrogen molecules released from the IMA into hydrogen atoms.

6. The single substrate hydrogen and microwave absorber of claim 5, wherein the titanium substrate is for reacting with the hydrogen atoms to create titanium hydrides that are inert with respect to the hydrogen sensitive components implemented in the IMA.

7. The single substrate hydrogen and microwave absorber of claim 5, wherein each of the channels comprises:

a pair of opposed channel walls that are approximately 0.003 -.005 inches deep; and

a channel floor between the pair of opposed side walls that is approximately 0.006 – 0.010 inches wide.

8. The single substrate hydrogen and microwave absorber of claim 1, wherein the titanium substrate is approximately .010 inches thick.

9. The single substrate hydrogen and microwave absorber of claim 1, wherein the titanium substrate has a length of approximately 1 cm and a width

of approximately 0.4 cm, and a combination of the titanium substrate and the layer of microwave absorbing material has a height of approximately 0.025 cm.

10. The single substrate hydrogen and microwave absorber of claim 1, wherein the single substrate hydrogen and microwave absorber has an associated volume of approximately .01 cm^3.

11. The single substrate hydrogen and microwave absorber of claim 1, wherein a total weight of the titanium substrate, the layer of microwave absorbing material and the layer of hydrogen getting material is approximately 0.045 gm.

12. The single substrate hydrogen and microwave absorber of claim 1, wherein the titanium substrate includes approximately $5.7x10^{20}$ titanium atoms available for hydrogen absorption.

13. A method of fabricating a single substrate hydrogen and microwave absorber for attenuating unwanted microwave signals in a metal Integrated Microwave Assembly (IMA) and for reducing hydrogen poisoning of hydrogen sensitive components implemented in the IMA (IMA), comprising:

forming channels in a single titanium substrate;

forming a layer of microwave absorbing material on portions 35 of the titanium substrate between the channels; and

depositing a layer of hydrogen getting material in the channels.

14. The method of claim 13, wherein the forming of the channels in the single substrate hydrogen and microwave absorber comprises forming the channels through isotropic chemical etching.

15. The method of claim 13, wherein the forming of the layer of microwave absorbing material on the portions of the titanium substrate between the channels comprises screen printing said microwave absorbing material on portions of the titanium substrate between the channels.

16. The method of claim 13, further comprising applying an anti-bonding material to the channels prior to the forming of a layer of microwave absorbing material on portions of the titanium substrate between the channels to prevent the layer of microwave absorbing material from bonding in the channels.

17. The method of claim 15, wherein the forming of the layer of microwave absorbing material on the titanium substrate further comprises:

drying the screen printed microwave absorbing material on the portions of the titanium substrate between the channels; and

firing the screen printed microwave absorbing material to bond the layer of microwave absorbing material on the portions of the titanium substrate between the channels.

18. The method of claim 13, further comprising applying an anti-bonding material on the portions of the titanium substrate between the channels prior to the depositing of a layer of hydrogen getting material in the channels to prevent the layer of the hydrogen getting material from bonding to the portions of the titanium substrate between the channels.

19. The method of claim 13, further comprising preparing the channels for the depositing of a layer of hydrogen getting material on the channel floors and the channel walls.

20. The method of claim 13, wherein depositing a layer of the hydrogen getting material in the channels comprises:

depositing the layer of hydrogen getting material on floors and walls of the channels, as well as on the portions of the titanium substrate between the channels of the titanium substrate;

subsequently removing the layer hydrogen getting material from the portions of the titanium substrate between the channels;

bonding the layer of hydrogen getting material on the channel floors and the channel walls of the titanium substrate; and

removing the layer of hydrogen getting material from the portions of the titanium substrate between the channels.

21. An integrated Microwave Assembly (IMA), comprising:

a metal housing defining a cavity including walls for isolation and a lid for enclosing the cavity;

monolithic microwave integrated circuits (MMICs) for amplifying radio frequency (RF) signals propagating through the cavity in the metal housing;

the MMICs including hydrogen sensitive components comprising one or more of a High Electron Mobility Transistor (HEMT), a Metal Semiconductor Field Effect Transistor (MESFET) and a thin film resistor;

at least one single substrate hydrogen and microwave absorber located within the IMA metal housing for suppressing spurious radio frequencies and for absorbing excess hydrogen within the IMA.

22. The IMA of claim 21, wherein at least one single substrate hydrogen and microwave absorber located within the IMA metal housing further comprises:

a titanium substrate;

channels formed in the titanium substrate and spaced apart from one another by a predetermined distance;

a layer of microwave absorbing material formed on portions of the titanium substrate between the channels; and

a hydrogen getting material formed in the channels of the titanium substrate.

23. The IMA of claim 21, further comprising one or more additional single substrate hydrogen and microwave absorbers located within the IMA metal housing for suppressing spurious radio frequencies and for absorbing excess hydrogen within the IMA.